DOCUMENT RESUME

ED 244 288 CS 208 333

AUTHOR Foster, Gretchen
TITLE Technical Writing and Science Writing: Is There a Difference and What Does It Matter?
PUB DATE Mar 84
NOTE 16p.; Paper presented at the Annual Meeting of the Conference on College Composition and Communication (35th, New York City, NY, March 29-31, 1984).
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052) -- Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Assignments; Comparative Analysis; *Content Area Writing; Course Objectives; *Science Education; *Student Attitudes; *Technical Writing; *Writing Exercises; *Writing Instruction; Writing Research

ABSTRACT

In order to help science students communicate more effectively with people outside their field, a two-semester technical writing course was developed with an emphasis on thinking rather than on blind adherence to the rules and forms of technical writing. The initial test group was composed of freshman science majors with exceptional writing ability. After initial writing assignments revealed that the students' writing--both general and technical--was in most cases very formative and that the students held odd notions about how to write technical essays, an informal questionnaire was issued to discover student ideas about the nature of technical writing. Data revealed that students differentiated between technical and science writing, the former being done by scientists for their peers, the latter being done for a general audience. Several teaching exercises were used effectively to have students begin to understand that technical writing is not undifferentiated--it has more and less technical forms--and that, in order to communicate information clearly and directly, many of the same conventions used in general science writing may apply. (Two complete student exercises, an attitude questionnaire, and a course description are included in the paper.) (CRH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

X Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED244288

Technical Writing and Science Writing:
Is There a Difference and What Does it Matter?

Gretchen Foster

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Gretchen Foster

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CS 208 333

Gretchen Foster

Technical Writing and Science Writing: Is There a Difference and What Does It Matter?

The answers--not to prolong the suspense--are "Yes" and "A great deal." I would suggest that students who learn only technical writing will be handicapped throughout their writing lives. Conversely, students who do not learn what technical writing is--and what it isn't-- will also be handicapped. In either case, they will rely on technical jargon instead of technical language; they will follow canned formats without knowing why; and they will be the slaves of received wisdom about what makes good writing without knowing how to judge its merits. In short, they will be bound to the rules and forms of writing rather than becoming thinkers who can express their ideas clearly, directly, and even gracefully in a whole range of ways from the popular essay to the technical report.

When I first began teaching a year-long freshman writing course entitled "Writing for Science Majors," I must confess that I thought of myself, rather proudly, as a teacher of technical writing. Even though the course began with the basic forms of writing like description, narrative, exposition, and argument, I could hardly wait to get to the "real stuff"--technical writing. My students might be struggling to describe a simple event now, but when we got to technical writing (in the spring term), their styles would glow and their ideas would come with crystal clarity. After, they were science majors picked especially for their ability to write well. They were the top ten percent of a group already

accustomed to clear "scientific" thinking. I was going to learn a lot about science from them.

When we finally got to the Spring term, I certainly did learn a lot. I discovered that their technical writing was about as advanced as their general writing (still very formative in most cases). More basic than that, their ideas about how to write technical essays revealed some odd notions of what technical writing was all about. As one student put it, with devastating candor: "If I can't understand it, I know it's technical." This stopped me short for a bit as I wondered what they'd been learning in their other cources in which they presumably had been reading technical writing. Since they were now going to be doing some of this themselves, I needed to find out if this opinion was just a ringer or typical of the class. I made up the informal questionnaire (bottom of p. 2, handout). About half of my class of 19 handed in answers. I circulated the same questionnaire this past winter term to all five sections of the science writing group and received about another 50 responses.

Without exception they differentiated between technical writing and science writing, and in pretty much the same terms. Typical statements were:

> Technical writing is anything written by a scientist to his peers--such that only his peers can understand. Science writing is every other "scientific writing."

> Technical writing is a short concise style, with a formal tone, to a technical audience, on a specific subject. Science writing can be formal or informal in tone, such

> as a popularized technical paper. . .the audience can be other scientists or laymen. Technical writing can be a form of science writing, but not vice versa.

And this comment from a student who wants to be a science writer:

> The purpose of technical writing is to present other scientists with one's theories and research. The purpose of science writing is to keep the public informed of the direction in which science is moving.

The students generally understood that science writing is a broad discipline encompassing a variety of writing styles and types from formal to informal, from personal essay to technical report. Within this, they often saw technical writing as occupying the "highly formal," "narrow audience" niche. However, there did seem to be a difference in responses between the third-term students and the second-term group. Almost all the third termers saw technical writing as a form of science writing--a response which the Science Writing course's third term encourages. Those still in the second term (in which they have not yet tackled popular and technical writing side by side) tended to see technical writing as separate from science writing.

The responses from both groups also revealed some potential problems with their views of technical writing.

1. Technical writing is for a narrow audience--"one's peers." This implies that microbiologists write to micro-

biologists, partical physicists to particle physicists, and hematologists to hematologists. It probably follows a fairly set, rather formal model--the prescribed format of the technical journals. It will use language--technical terms--that outsiders won't understand. Students are prepared "not to understand" quite a bit of what they see as "highly technical" writing.

2. Conversely, they see as "not very technical" essays on technical subjects which they <u>can</u> understand. When they read James Watson's and Francis Crick's two articles in <u>Nature</u> magazine reporting the discovery of DNA's structure and its implications for genetic duplication, they are surprised at "how easy to understand they are" and comment that "they're not really very technical. On the other hand, when they read the same discovery reported at length (with full technical panoply) in "The Proceedings of the British Royal Society," they complain that they "can't understand any of it; it's too technical." Yet the propositions and conclusions are the same ones with which they are familiar. They get so bogged down in the big technical middle of hard scientific proofs that they tend to reject the whole thing as "too technical for me."

This takes us back to the original student quote: "If I can't understand it, I know it's technical," and to the danger for those who teach science majors to write in not distinguishing between technical writing and science writing--and in not giving students ample experience with both forms, or I should say with the whole range of science writing within which technical writing is included.

If we assume that preparing technical reports, proposals,

business or professional letters, and journal articles (to quote the table of contents of a recent manual on technical writing) is the beginning and end of what science students need to know about writing, we are narrowing, even destroying, their chances to learn how to write clearly and effectively. What such an approach leads to is teaching a set of techniques (often mechanical) and encouraging students to fill in the blanks of set formats.

Furthermore, I submit, few scientists ever write just to their peers (especially in the business world), and even if they do, they need not write in the foreign and ephemeral language of technical jargon. Writing to a tiny "in group" encourages opacity of expression and idea because no one outside the author's speciality is supposed to understand it anyway. The writer who knows only how to put down an exclusive language in a set format will finally end up in the situation described in the jingle:

A wonderful city is Boston
The land of the bean and the cod
Where the Cabots speak only to Lodges
And the Lodges speak only to God.

When students believe that technical writing equals incomprehensible writing, two things follow: they write about things they don't really understand themselves and they accept such writing from others because "it's technical."

As I mentioned earlier, the spring term of science writing introduces the technical essay. In order to highlight what makes a technical essay technical, we ask the students to read some popular and technical essays on the same subject (by the same author when possible) and then to write two such

essays themselves--the popular first, then the technical.

Sylvia wrote a popular essay explaining the Periodic Table (on which all the elements are arranged according to atomic number). During a class discussion of her essay, I asked the class if they thought Sylvia should have defined the terms atomic weight, atomic number and periodic. Sylvia had assumed an educated layman would understand them, and the class agreed with her. They assured me that "everyone knows what atomic weight, atomic number and periodic mean. I granted that maybe they knew, but it wasn't all that clear to the educated layman, like me, whose high school chemistry was thirty years in the past. They looked at me pityingly, and a couple offered to "explain later" if I really wanted to know. Somehow, I felt their explanation might be about as clear as Sylvia's. So over a weekend spent brooding on the matter, I concocted an in-class writing assignment that would get me all the explanations I could desire. On Monday I gave them the assignment listed on page 2 of the handout (Whipple Chemicals, Inc.).

After I had handed this out and explained what I wanted them to do, a murmur arose. Its general drift was "I can't explain these terms--they're technical. Only chem majors understand them." This sounds too pat to be true, but it is. Apparently what they had meant by "everyone knows what those terms mean" was that everyone takes on faith thay they have something to do with the weight of atoms and how they're arranged on the Periodic Table, but, beyond that, they're too "technical" to try to explain. They were right about that. Out of 19 students, only two could explain all three terms clearly in "English," without the usual circular definition,

like atomic weight is the weight of the atom.

The assignment that gave rise to all this plays a crucial part in introducing students to what technical writing really is and how it is integrally connected with the broader discipline of Science Writing. When I made this assignment last spring, I assumed that students who were taking a whole range of technical subjects--chemistry, physics, computer science, calculus, biology--would have no trouble writing a four-page technical essay containing "hard science" of some sort. They had examples before them in the form of a reading assignment in which they read two essays--one popular and one technical--on the Irish Elk by Stephen Jay Gould ("The Misnamed, Mistreated, and Misunderstood Irish Elk," Ever Since Darwin; and "The Origin and Function of 'Bizarre' Structures," Evolution, June 1974).

Obviously, college freshmen aren't going to produce original research or even do extensive secondary research, so I encouraged them to write about something they already knew well (say a high school science project or a current lab experiment such as titration, or a familiar concept like the Periodic Table). The popular essay, with some hitches--like Sylvia's case--went well. After two terms of "Science Writing," most students could explain something they knew well in ordinary English using examples, analogies, and even similes and metaphors to make technical facts and concepts clear to the lay reader.

Their audience for the technical paper would be more specialized. To keep things realistic, I urged them to write a "teaching paper" for a scientific audience somewhat less knowledgeable than themselves (say high school seniors or

first-term college freshmen), or to write for their classmates in the science writing course.

Bob's paper on "Bipedal Locomotion in Hominids" revealed what happens when students assume that technical writing is popular writing dressed up in technical terms--or I would say obfuscated by technical jargon. Bob took his straightforward and readable popular essay about theories of how early man went from four-footed walking to two-footed walking, rearranged it into a more technical format and then simply translated as much of his language as he could into blockbuster latinisms or abstractions: "two-footed walking" became "bipedal locomotion of hominids"; "Rainfall decreased and food was scarce" became "Increased dessication of the jungle reduced the availability of food." Other than this, there was no difference between his popular and technical essays--except that his technical essay was unreadable.

Although Bob's is an extreme case, many students reached for some of these gimmicks in writing their technical essays. By the time we worked through the whole assignment, paying attention to what was really technical in essays like Gould's and noting that even technical essays (good ones at least) contained plain language, especially in the proposal and conclusions, not to mention the connections between ideas, they came to understand that good technical writing is not simply popular writing formatted and opacified with latinate terms. Moreover, they begin to see that it, like the broader discipline of science writing which they had been studying for two terms, and of which it is a branch, requires clarity, directness and even has room for grace.

Finally, they began to understand that technical writing

Itself is not an undifferentiated monolith. It has its "more and less technical" forms. The major project of the spring term makes this last point even clearer to students. At the beginning of the term, they receive the assignment summarized on page 3 of the handout. It asks them to survey and compare the styles and content of technical journals in their own major fields. They work in groups of four or five and spend about seven weeks on the project. First, they pick a group of about 15 journals to survey in say "Medicine." Each student analyzes four or five and makes a 2-page written report on the main features of each journal (see handout). Using these reports, the group picks five journals to report on for the final paper. They usually look for variety in both style and content because they will be comparing and contrasting the journals in their reports. The list one of last year's "Medics" came up with is at the bottom of page 3 of the handout. You can see there is quite a range.

This group waxed poetic in describing some of the differences among journals. They called JAMA the "Cadillac of medical journals," and they noted that even the ads partook of the journal's tone. An ad for Campbell's Soup "is interesting because it gives the scientific facts concerning the soup, instead of just saying how good it is for you." Even when they couldn't understand the journal's articles very well, they became aware of how they were written, what range of subjects they covered, and what audience they were written for. They began to see that, though technical writing was different from the other kinds of writing they had been doing (and reading), it still had to convey information and ideas clearly and directly. And it did have a relation

to the real world and to themselves.

If we only teach our science students something called technical writing, we insulate and isolate them from this world. They are human beings before they are microbiologists or partical physicists, and so are their colleagues. Moreoever, the person who can read and write in plain English can read and write in technical language--and will be confident enough to insist that such language be clear, direct and as simple as possible. For writing--even technical writing--is a human and humane enterprise. It should link people together, not separate them.

Finally, narrowly technical writing full of technical jargon becomes less and less useful as scientists--especially those in business--progress in their careers. Senior scientists have to explain things to nonspecialist vice presidents and boards of directors. Even professors have to explain their needs for grants or bank loans to nonspecialists. As more and more academics join in the high tech adventure, they will <u>have</u> to speak and write in plain English. We do them an eternal disservice if we neglect to teach them how.

Let me leave you with two examples of technical writing (to my understanding "technical jargon supreme") that does not speak in plain English. The first is from a business consulting firm's brochure. Here is how they describe their success as a firm:

> The initial response to the availability and utilization of XYZ, Inc.'s services has borne out the principals' belief in the viability of their idea.

Here is one of the projects they've worked on:

> Municipalities have similarly benefited from Mr. Johnson's

expertise in the preparation of economic development plans and the organization and implementation of economic development implementation programs.

And here is a lovely example from law--from a form book currently in use. It is a "short form" for a general release of claims:

Know all men by these presents; That I John Doe, for and in consideration of the sum of one thousand Dollars, to me in hand paid by Steven Smith, have remised, released, and forever discharged Steven Smith from all claims of every kind, nature and character whatsoever against him from the beginning of the world to this day.

Whoever wrote that was writing strictly to the God of technical nonsense. Let's teach our students to write to all of us.

Panel on "The Writing of Science,
the Science of Writing, and the Art of Both"

Matt Nikkari
Martin Wood
Gretchen Foster
presenters

Department of English
Morrill Hall
Michigan State University
East Lansing, Michigan 48824
(517) 355-7570

Description of the three-term sequence for freshmen "Writing for Science Majors" (English 104, 105, 106), Michigan State University.

English 104 Writing for Science Majors

English 104 is a writing workshop that helps students improve their writing by frequent practice at writing in a variety of modes and for a variety of purposes. It also aims to develop students' ability to analyze good and bad writing--to see what works, what doesn't, and why--and to improve their own writing on the basis of such analyses. The writing assignments include detailed description, personal essay, argument, and a scientific autobiography. Other coursework consists of analysis and discussion of one's own and others' writing, and reading and discussion of various kinds of writing by scientists.

English 105 The Scientist as Writer

Like English 104, English 105 gives students practice at writing in various modes and for various purposes. The workshop elements of 104--rough drafts, critiques of each other's writing, and revisions--continue to play a role in the second term. However, English 105 gives more time to reading and analyzing the writing of professional scientists than does 104. In 105, the wide range of the kinds of writing done by scientists becomes a major emphasis of the course. Students read technical and popular scientific articles, personal essays by scientists, history of science, scientists' autobiographies, and science fiction. The writing assignments are modelled to some extent on the readings.

English 106 Introductory Scientific Writing

English 106 pays special attention to scientific writing--students read and write technical papers, descriptions of procedures, explanations of principles, and so on. To a lesser extent, it focusses on science writing--students read and write popular essays, sometimes by the same authors or on the same subjects as the more technical pieces they have read or written. Other kinds of reading and writing arise occasionally; discussion and writing workshop sessions continue in the third term of the sequence.

In-Class Exercise for English 106

As an up-and-coming chemist with Whipple Chemicals, Inc., you have been asked to make a presentation at the company's "Educate the Board of Directors" program. Whipple Chemicals selects people to make these presentations partly to educate the Board and partly to evaluate its employees for promotion. Your assignment includes explaining these basic aspects of the Periodic Table: 1) Atomic weight 2) Atomic number 3) Periodicity. The Board members include a bank president, a hardware store owner who quit school after the eighth grade and is now worth five million dollars, a dentist, a legal aid attorney, a 50-year-old woman who has recently begun selling real estate, Mr. Whipple (age 55), and Mr. Whipple, Sr. (age 78). Explain these three concepts clearly. Use as many as possible of the techniques we discussed last week (examples, analogies, graphics like drawings, diagrams, etc., metaphors and similes). You will have a blackboard available for your presentation. If you plan to put certain things on it, indicate in your paper which they are.

Science Writing Questionnaire

Is there a difference between Technical Writing and Science Writing? (Science Writing is "the scientist writing about science.) Based on what you've read this year (in this class and other classes, or even on your own), how would you define each term? Consider the following in your definitions: writing style, tone, audience, author's purpose, subject matter.

English 106 Group Project: Compare and contrast the style and content of journals in a particular scientific field (e.g., physics, medicine, chemistry, mathematics, biology).

1. Organize into groups by major or related major field. Make a list of about 15 journals in your group's field. Your list should cover several different areas in the general field, although each individual journal may be more or less specialized. Divide the list among the group members.

2. Research: Find the "Instructions to Authors (Contributors)" in the journal. Find out what kinds of details these instructions focus on. What would you have to watch for in submitting an article to the journal? How would the article differ from the popular essays we have read this year?

Examine the articles (including editorials, letters, and reviews) in each journal for such features as: degree of specialization; variety of subject; theory vs. data; use of tables, graphs, statistics; and any other things that strike you in the journals. Look at several issues of the journal covering the last year or two.

Type a 2-page summary analysis of each journal's stylistic conventions and the kinds of articles it publishes. Turn in a copy of these to your instructor.

3. Writing: As a group, choose 5 journals from those you have examined. Select journals that have a wide range of style and kinds of articles. Compare notes with your fellow group members and discuss your findings. Pay attention to the differences and similarities among the journals.

Assign members of your group to write a draft of the following parts of your report:

a. a 1-2 page introduction, describing the report's relevance to science students and outlining its approach.
b. a 2-page revised summary of the stylistic conventions and kinds of articles for each of your five journals.
c. a 3-4 page discussion comparing and contrasting the journals. Keep in mind such factors as audience, purpose (the journal's and the authors'), and subject matter.

4. Edit your draft to correct and improve the writing and to smooth out differences in tone and style among sections. Your group will receive a single grade for this project, so you should work together and help each other as much as possible, just as if you were a research team preparing a report for your department head.

Journals Selected by a "Medical" Group

Medical Opinion
Drug Therapy Hospital
JAMA (Journal of the American Medical Association)
Medicine
Contemporary Surgery